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DETAILED DESCRIPTION

[Detailed description]
[0001]
[The technical field to which invention belongs] this invention relates to the image processing system which processes to the inputted image data and is outputted to an output unit and its control technique, an image processing system, an output unit, and a storage.
[0002]
[Prior art] Conventionally, the image data a photograph of was taken with the digital camera was transmitted with personal **, and the output of image data was performed by the printer connected with the personal computer. However, in order to enable use of a digital jar also at the user who is not a personal computer user, the direct file of a digital camera and a printer is made possible, and the image processing system which can record the picture image based on image data is developed.

[0003] The storage capacity of the storage for generally memorizing the image data based on the picture image a photograph of was taken to the digital camera has a limit. Therefore, in order to enable it to memorize many image data as much as possible to the storage, JPEG compression of the image data is carried out, and it memorizes to a storage. In order to perform the record (direct print) by the printer by which the direct file was carried out to the digital camera in such image data by which JPEG compression was carried out, the storage which has the storage capacity for the amount of image data which carries out JPEG defrosting of the image data by which JPEG compression was carried out, and is obtained in a digital camera or a printer is needed. Now, the printer of the image processing system which has realized this direct print does not record two or more image data minutes of A6 size in the record operation which keeps on record to the record medium of one sheet for A6 size. Therefore, it is realizable if there is a storage (buffer memory) with the storage capacity for image data of A6 size. However, like drawing 1 , when recording three picture images, A, B, and C, on the record medium of A4 size at the scanning direction of the record head of a printer, [for example,] Since the number recordable by one scanning of a record head of pixels is limited, in a scanning of the record head which is the 1st time What is necessary is just to memorize the image data corresponding to the record section of each record medium to buffer memory one by one, as the image data corresponding to the fraction of A1, B1, and C1 in drawing 1 was said to buffer memory as the fraction of A2 in drawing 1 , B-2, and C2 by the scanning of storage and the 2nd record head.
[0004]
[Object of the Invention] However, in the above-mentioned conventional image processing system, although it becomes possible by having the buffer memory for three image data which carried out JPEG defrosting of the image data of A, B, and C of A4 size by which JPEG compression was carried out in a digital camera or a printer in order to realize the above records, problems, such as a cost, to implementation is difficult for this.
[0005] Moreover, it has the buffer memory for one image data which carried out JPEG defrosting of the image data of A4 size by which JPEG compression was carried out in a digital camera or a printer. The image data of A JPEG defrosting, the writing to the buffer memory of the image data of inner A1 fraction of the image data of A, The image data of B JPEG defrosting, the writing to the buffer memory of the image data of inner B1 fraction of the image data of B, JPEG defrosting

of the image data of C, the writing to the buffer memory of the image data of inner C1 fraction of the image data of C, A scanning of the 1st record head, and the image data of A JPEG defrosting, the writing to the buffer memory of the image data of inner A2 fraction of the image data of A, The image data of B JPEG defrosting, the writing to the buffer memory of the image data of the inner B-2 fraction of the image data of B, By performing a record which is called JPEG defrosting of the image data of C, the writing to the buffer memory of the image data of inner C2 fraction of the image data of C, and scanning of the 2nd record head, although buffer memory can also be saved Since the number of times the image data by which JPEG compression was carried out carries out [a number of times] JPEG defrosting increases, the problem that a record speed falls occurs.

[0006] It aims at offering the image processing system which can improve a total throughput and its control technique, an image processing system, an output unit, and a medium, without making this invention in view of the above-mentioned trouble, and raising a cost.

[0007]

[The means for solving a technical problem] The image processing system by this invention for solving the above-mentioned purpose is equipped with the following configurations. That is, it is the image processing system which processes to the inputted image data and outputs to an output unit, and it has the means of communications which communicates to the aforementioned output unit and mutual, a receiving means receive the output unit information which shows the output unit of the image data of the aforementioned output unit from this output unit through the aforementioned means of communications, and a compression means divide and compress the image data by which the input was carried out [aforementioned] based on the output unit information received with the aforementioned receiving means.

[0008] Moreover, the aforementioned compression means is preferably equipped with a storage means to memorize the compressed image data. Moreover, a setup about an expansion of the picture image which outputs the aforementioned output setup at least again preferably / [which transmits preferably the image data memorized by the aforementioned storage means according to the output setup of the aforementioned output unit and the aforementioned output unit to this output unit through the aforementioned means of communications] reduction percentage, and a picture image size is included.

[0009] Moreover, preferably, the image data by which the input was carried out [aforementioned] is divided per predetermined, and the aforementioned compression means compresses it. Moreover, the aforementioned predetermined unit is the number of pixels of the multiple of 8 preferably. The aforementioned compression means divides and compresses the this inputted image data for every number of pixels of the multiple of the above 8 to either [at least] the orientation of a pixel of the image data by which the input was carried out [aforementioned], or the orientation of a line.

[0010] Moreover, the aforementioned means of communications is an IEEE1394 serial bus preferably. The control technique of the image processing system by this invention for attaining the above-mentioned purpose is the control technique of the image processing system which is equipped with the following configurations, namely, processes them to the inputted image data, and outputs them to an output unit, and it has the receiving process which receives the output unit information which shows the output unit of the image data of the aforementioned output unit from this output unit, and the pressing operation divide and compress the image data by which an input was carried out [aforementioned] based on the output unit information received at the aforementioned receiving process

[0011] The image processing system by this invention for attaining the above-mentioned purpose is equipped with the following configurations. Namely, it is the image processing system which has the image processing system which processes to the inputted image data, and the output unit which outputs the picture image based on the image data processed by this image processing system. The means of communications which communicates mutually by the aforementioned image processing system and the aforementioned output unit, and the aforementioned means of communications are minded. A 1st transfer means to transmit the output unit information which shows the output unit of the image data of the aforementioned output unit to the aforementioned

image processing system, A compression means to divide and compress the image data by which the input was carried out [aforementioned] based on the output unit information notified with the aforementioned notice means, It has a 2nd transfer means to transmit the image data compressed with the aforementioned compression means according to the output setup of the aforementioned output unit and the aforementioned output unit to this output unit, through the aforementioned means of communications.

[0012] The output unit by this invention for attaining the above-mentioned purpose is equipped with the following configurations. That is, it is the output unit which outputs the picture image based on the image data inputted from the image processing system, and has the means of communications which communicates to the aforementioned image processing system and mutual, a transmitting means to transmit the output unit information which shows the output unit of the image data of the concerned output unit to the aforementioned image processing system through the aforementioned means of communications, and a receiving means to receive the aforementioned output unit and the image data according to an output setup of the concerned output unit from the aforementioned image processing system through the aforementioned means of communications.

[0013]

[Gestalt of implementation of invention] Although the following enforcement gestalt explains the example which used the digital interface (D-I/F) for the connection between a digital camera and a printer, this is preceded and IEEE1394 is explained as representation technique of D-I/F employable with this enforcement gestalt.

In order to communicate a video data, audio data, etc. in connection with an appearance of digital VCR for schema>> public welfare of the technique of <<IEEE1394, or DVD player, it is real time and the support of the data transfer of high amount of information is needed. In order to transmit such video datas and audio data on real time and to transmit to the digital instrument of incorporating in a personal computer (PC) ****, or others, the interface equipped with the required transfer facility in which a high-speed-data transfer is possible is needed. The interface developed from such viewpoints is IEEE 1394-1995 (it is called HighPerformance Serial Bus and a following 1394 serial bus).

[0014] Drawing 11 is drawing showing the example of a configuration of the network system constituted using 1394 serial bus. This system is equipped with devices A, B, C, D, E, F, G, and H, and it connects by the twisted-pair cable of 1394 serial bus, respectively between A-B, between A-C, between B-D, between D-E, between C-F, between C-G, and between C-H. These devices A-H are a personal computer, digital VTR, DVD, a digital camera, a hard disk, a monitor, a tuner, etc.

[0015] The connection formula between each device enables mixture of a daisy-chain formula and node multipoint system, and high connection of degree of freedom is possible for it. Moreover, each device has peculiar ID each one, and when each recognizes each other, it constitutes one network in the domain connected by 1394 serial bus. Between each digital instrument is only connected one by one by one 1394 serial bus cable, respectively, and each device performs the role of a relay and constitutes one network collectively. Moreover, 1394 serial bus has a Plug&Play function, and when it connects a cable to a device, it has the function to recognize a recognition; the connection status, etc. of a device automatically.

[0016] Moreover, in a system which was shown in drawing 11 , when a certain device is deleted from a network or it newly adds, after performing a bus reset automatically and resetting the network configuration till then, a new network is reconstructed. By this function, the configuration of the occasional network can always be set up and recognized.

[0017] Moreover, it has 100/200/400Mbps, the device with the transfer rate of a high order supports a low-ranking transfer rate, and a data transfer rate takes compatibility. There is Isochronous transfer mode in which Asynchronous transfer mode in which asynchronous datas (it is called below Asynchronous data:Async data), such as a control signal, are transmitted, and synchronous data (it is called below Isochronous data:Iso data), such as a real time video data and audio data, are transmitted as data transfer mode. This Async data and Iso data giving priority to Iso data transfer over Async data, after transmitting the cycle-start packet (CSP) which shows cycle start in each cycle (usually 1 cycle 125microsecond), within a cycle, it is intermingled and

they are transmitted.
[0018] Drawing 12 is drawing showing the component of 1394 serial bus. 1394 serial bus consists of layer (hierarchy) structure collectively. As shown in drawing 12 , there is a connector port where the cable and connector of 1394 serial bus are connected, and the physical layer and the link layer are positioned as hardware on it.
[0019] The hardware section is the fraction of a substantial interface chip, among those a physical layer performs coding, a control of a connector relation, etc., and a link layer performs a packet transfer, a control of the cycle time, etc. The transaction layer of the firmware section manages the data which should be transmitted (transaction), and issues an instruction of Read, Write, and Lock. It is the fraction which serial bus management (management layer) performs a management of the connection status of each device connected, or ID, and manages the configuration of a network. Even the above hardware and firmware are the configuration of 1394 serial bus on the parenchyma.
[0020] Moreover, the application layer of the software section changes with application software to use, it is the fraction which specifies the data which carry on an interface, and the printer protocol, AVC protocol, etc. are specified. The above is the configuration of 1394 serial bus. Drawing 13 is drawing showing the address space in 1394 serial bus. 64 bit addresses peculiar to each node are surely given each device (node) connected to 1394 serial bus. And by storing this address in ROM, while the node address of himself's or a partner can always be recognized, the communication which specified the partner can also be performed. Addressing of 1394 serial bus is a formula according to IEEE1212 specification, 10 bits of the beginning are used for specification of the number of a bus, and, as for an address selection, the following 6 bits are used for specification of a node identification number. And the remaining 48 bits become the address width of face given to the device, and can use it as a respectively peculiar address space. In addition, identification of each device, 28 bits of the informations on specification of a service condition etc. of the second half in 48 bits, etc. are stored as a field of peculiar data.
[0021] The above is the schema of the technique of 1394 serial bus. Next, the fraction of the technique which can be called characteristic feature of 1394 serial bus is made to explain to a detail more.
Electric specification>> drawing 14 of a <<1394 serial bus is the cross section of 1394 serial bus cable. By 1394 serial bus, the power line other than six pins, i.e., 2 sets of twisted-pair signal lines, is prepared in the interconnection cable. By this, supply of power is attained at the device without power, the device which carried out sag by failure. In addition, 8-40V, and the current are specified for the voltage of the power which flows the inside of a power line as maximum-current DC1.5A. In addition, it is constituted from the specification called DV cable by four pins which excluded power.
[0022] <<DS-Link coding>> drawing 15 is drawing for explaining the DS-Link coding formula of a data transfer format adopted by 1394 serial bus. The DS-Link (Data/Strobe Link) coding formula is adopted by 1394 serial bus. This DS-Link coding formula is suitable for the high-speed serial-data communication, and the configuration needs two signal lines. It is the configuration of sending the data which become main [one] among twisted pair wires, and sending a strobe signal to the twisted pair line from another side's. In a receiving side, a clock is reproduced by taking the exclusive OR of this data that communicates, and a strobe. Since there is no need of sending the information which shows it being an idle state when there are not that the circuit scale of controller LSI can be made small and data which should be transmitted further, since that a transfer efficiency is high and PLL circuit become unnecessary as a merit using this DS-Link coding formula compared with 8 / 10B conversion, it is mentioned by the ability changing the transceiver circuit of each device into the ******** status that a reduction of power consumption can be aimed at etc.
[0023] By sequence>>1394 serial bus of <<bus reset, node ID is given to each device (node) connected, and it is recognized as a network configuration. When this network configuration has change (for example, when change arises and it is necessary to recognize a new network configuration by increase and decrease of the number of nodes by **** of a node, ON/OFF of power, etc.), each node which detected change transmits a bus reset signal on a bus, and goes into

the mode in which a new network configuration is recognized. The detection technique of the change at this time is performed by detecting change of the bias voltage on 1394 port substrate.
[0024] If a bus reset signal is transmitted from a certain node, occurrence of a bus reset will be transmitted to a link layer, and the physical layer of each node will transmit a bus reset signal to other nodes at the same time it receives this bus reset signal. A bus reset is started after all nodes finally detect a bus reset signal. A bus reset is started also by taking out a direct instruction to a physical layer by the host control from a protocol etc., although cable **** which was described previously, and the hard detection by the abnormalities in a network etc. start. Moreover, when a bus reset starts, data transfer will be interrupted temporarily and data transfer will be kept waiting during processing of the concerned bus reset. And it is resumed under a new network configuration after an end of a bus reset. The above is the sequence of a bus reset.
[0025] After a sequence>> bus reset of <<node ID decision, each node goes into the operation which gives ID to each node, in order to build a new network configuration. The general sequence to the node ID decision from a bus reset at this time is explained using drawing 23 and the flow chart of 24 and 25.
[0026] Drawing 23 is a flow chart which shows work of a series of bus until it determines node ID from occurrence of a bus reset and it can perform data transfer. First, in step S101, if it monitors continuously that a bus reset occurs in a network and a bus reset occurs by power ON/OFF of a node etc. here, it will move to step S102. At step S102, from the status that the network was reset, in order to know the connection status of a new network, declaration of a parentage is made between each node by which the direct file is carried out. In step S103, if it is judged that the parentage was determined among all nodes, it will progress to step S104 and the one root will be determined. In addition, the parentage of step S102 is declared and the root is not determined, either, until it determines a parentage among all nodes.
[0027] If the root is determined at step S104, in step S105, setting work of node ID which gives ID to each node will be performed. In the order of a predetermined node, a setup of node ID is performed, and setting work is repeatedly performed until ID is given to all nodes (step S106). When it finally finishes setting ID as all nodes, it means that the new network configuration was recognized in all nodes. Therefore, processing progresses to step S107 from step S106, and will be in the status that data transfer between nodes can be performed, and data transfer is started.
[0028] And if it will be in the status of this step S107, and it will go into the mode which supervises that a bus reset occurs again and a bus reset will occur, the setting work from step S101 to step S106 will be performed repeatedly. The above explains the fraction from a bus reset of the flow chart of drawing 23 to root decision, and the procedure from after root decision to ID setting end still in detail with reference to drawing 24 and drawing 25 , although it is an explanation of the flow chart of drawing 23 . Drawing 24 is a flow chart explaining processing from the bus reset in each node to root decision. Moreover, drawing 25 is a flow chart which shows the procedure from after root decision to ID setting end.
[0029] First, it explains with reference to drawing 24 . If a bus reset occurs in step S201, a network configuration will once be reset and processing will progress to step S202. In addition, at step S201, it is always supervising that a bus reset occurs. Next, in step S202, the flag which shows that it is a leaf (node) to each device as the first phase of the work which has a new appreciation of the connection status of the reset network is stood.
[0030] Next, in step S203, it investigates how many the port which he has [each device] is connected with other nodes. At step S204, in order to begin declaration of a parentage based on the number of ports, undefined (parentage is determined and there is nothing) number of connections is investigated. Although it is the number of number [of ports] = undefined ports immediately after a bus reset, the undefined number of connections detected at step S204 changes as the parentage is determined.
[0031] First, it is restricted to the leaf immediately after the bus reset that a parentage can be declared first. It can know that it is a leaf by authentication of the number of ports of step S203. That is, a parentage is [the number of a leaf of undefined ports] the thing of 1 in the phase of the undefined. In step S205, to the node connected to itself, a leaf is announced "He is a child and partners are parents", and ends an operation.

[0032] Since the node which there are two or more numbers of ports at step S203, and has been recognized to be a branch will call it undefined port number >1 at step S204 immediately after a bus reset, it moves to step S206 and a flag called a branch is stood. And it waits in order to receive "parents" by parentage declaration from a leaf at step S207. Other nodes which are leafs declare a parentage and the branch which received it at step S207 checks the number of undefined ports of step S204 suitably. Here, it is enabled to declare "Child (he to be a child)" of step S205 to the node connected to the port which remains if the number of undefined ports is 1. It waits in order to receive the "parents" from a leaf or other branches at step S207 again to a certain branch two or more, even if it checks the number of undefined ports by processing of step S204 after the 2nd times.

[0033] Finally, when a leaf becomes a zero exceptionally as any one branch or a result which is authentication of the number of undefined ports of step S204 (although child declaration could be performed, since it did not operate quickly) Declaration of the parentage of the whole network is completed now, the flag of the root is stood in step S208, and, as for the only node from which the number of undefined ports became the zero (considering all as parents' port decision), the recognition as root is made in step S209. Thus, the bus reset shown in drawing 24 to declaration of the parentage in a network between all nodes is completed.

[0034] Below, the flow chart of drawing 25 is explained. First, since the information on the flag of each node called a leaf, a branch, and the root is set up by the sequence to drawing 24 , it carries out based on this and classifies according to step S301, respectively. As work which gives ID to each node, it is from a leaf that ID can be set up first. A setup of ID is made from the young number (node-number =0-) in the order of the leaf -> branch -> root.

[0035] In step S302, several N (N is the natural number) of the leaf which exists in a network is set up. Then, it is required that each leaf gives ID to the root in step S303. When there are two or more these demands, the root performs an Arbitration in step S304, and notifies to the node in which gave the identification number and one node which won in step S305 was lost as a result of a failure. The leaf which ID acquisition finished with the failure in step S306 advances ID request again, and repeats the same work.

[0036] The leaf which has acquired ID transmits ID information on the node to all nodes by broadcasting in step S307. After broadcasting of a 1 node ID information finishes, one several N of the remaining leaf is reduced in step S308. Here, in step S309, one or more, in a certain case, several N of this remaining leaf repeats work of the ID request from step S303, and carries out. And if all leafs finally broadcast ID information, it will be set to N= 0 in step S309, and will move to step S310 for ID setup of a branch.

[0037] ID setup of a branch as well as the time of a leaf is performed. First, several M (M is the natural number) of the branch which exists in a network in step S310 is set up. Then, it is required that each branch gives ID to the root as step S311. On the other hand, in step S312, the root performs an Arbitration and gives it to the degree of the number which it finished giving to a leaf from the young number sequentially from the branch which won. In step S313, the root notifies ID information or a failure result to the branch which issued the demand. In step S314, the branch which ID acquisition finished with the failure advances ID request again, and repeats the same work.

[0038] It progresses to step S315 from the branch which has acquired ID, and ID information on the node is transmitted to all nodes by broadcasting. After broadcasting of a 1 node ID information finishes, one several M of the remaining branch is reduced in step S316. here -- step S317 -- setting -- several [of this remaining branch] -- in a certain case, M repeats work of the ID request from step S311 one or more, and it is carried out until all branches finally broadcast ID information If all branches acquire node ID, it will be set to M= 0 in step S317, and ID acquisition mode of a branch will be completed.

[0039] Since the node which finally does not acquire ID information is only the root after ending so far, the youngest number is set up with its identification number by the number which has not been given in step S318, and ID information on the root is broadcast as step S319. As shown in drawing 25 , after determining a parentage above, a procedure until ID of all nodes is set up is completed.

[0040] Next, the network construction operation at the time of the bus reset in the actual network shown in drawing 16 is explained as an example. Drawing 16 is drawing for explaining the network construction operation at the time of a bus reset. In drawing 16 , the direct file of node A and node C is carried out to the low order of node B (root), the direct file of the node D is further carried out to the low order of node C, and it has the layered structure by which the direct file of node E and the node F was further carried out to the low order of node D. The procedure of determining such a layered structure and a root node, and node ID is explained below.
[0041] After carrying out a bus reset, in order to recognize the connection status of each node first, declaration of a parentage is made between the ports where the direct file of each node is carried out. With this parent and child, a parents side can say that it becomes a high order by the layered structure, and a child side serves as low order. At drawing 16 , node A declared the parentage to the beginning after the bus reset. A parentage can be declared from the node (it is called a leaf) which has connection only in one port of a node fundamentally. Since it can know first that he has only connection of one port as for this, it recognizes that it is the edge of a network by this, and the parentage is determined from the node which operated early in it. In this way, the port of the side (between A-B node A) which declared the parentage is set up with a child, and the port of the other party (node B) is set up with parents. In this way, among node A-B, it is determined among child-parents and node F-D among child-parents and node E-D that they will be child-parents.
[0042] the further first floor layer -- it goes up and a parentage is shortly declared to a high order further one by one from what received declaration of the parentage from other nodes among the nodes (it is called a branch) with two or more connection ports In drawing 16 , first, after determining a parentage between D-E and between D-F, node D is declaring the parentage to node C, and, as a result, it is determined among node D-C that it will be child-parents.
[0043] Node C which received declaration of the parentage from node D is declaring the parentage to node B connected to another port. It is determined among node C-B by this that they will be child-parents. Thus, a layered structure like drawing 16 will be constituted and node B which finally became parents in all the ports connected will be determined as a root node. As for the root, only one exists in one network configuration.
[0044] In addition, although node B was determined as the root node in this drawing 16 , if this is performing parentage declaration to early timing to the node of others [B / node / which received parentage declaration from node A], it has moved from the root node to other nodes. That is, by some timing transmitted, every node may turn into a root node, and a root node is not necessarily regularity at the same network configuration, either.
[0045] If a root node is determined, next, it will go into the mode in which each node ID is determined. Here, all nodes notify their node ID to all other nodes (broadcasting function). [who determined] The self-ID information includes the information on its node number, the information on the position connected, the number of connections that it has, the number of connections with connection, and the parentage of each port etc.
[0046] the node (leaf) which has connection only in one port first as a procedure of assignment of a node identification number **** -- it can start -- the order from this inside -- node-number = -- it is assigned with 0, 1, and 2 -- The node which gained node ID transmits the information containing a node number to each node by broadcasting. It is recognized by this that the identification number is "finishing [assignment]."
[0047] If all leafs finish acquiring self-node ID, the node identification number which next moved to the branch and followed the leaf will be assigned to each node. A node ID information is broadcast one by one like a leaf from the branch to which the node identification number was assigned, and, finally a root node broadcasts a self-ID information. That is, the root always owns the greatest node identification number.
[0048] Assignment of node ID of the whole layered structure finishes as mentioned above, a network configuration is reconstructed, and initialization work of a bus is completed.
By <<Arbitration>>1394 serial bus, the Arbitration (mediation) of a bus royalty is surely performed in advance of data transfer. Since 1394 serial bus is a logical bus type network as each device connected individually tells this signal in a network to all devices by relaying the transmitted signal, respectively, the Arbitration is required of the meaning which prevents a

collision of a packet. Only one node can transmit by this at a certain time.
[0049] Drawing 17 is drawing explaining the Arbitration in 1394 paper real bus. Especially (a) of drawing 17 shows flowing of a bus use demand, and (b) of drawing 17 shows flowing of a bus licence. If an Arbitration starts, one or two or more nodes will emit a demand of a bus royalty toward a parent node, respectively. Node C and node F of drawing 17 (a) are the node which has emitted the demand of a bus royalty. The parent node (drawing 17 node A) which received this emits a demand of a bus royalty toward a parent node further (it acts as intermediary). This demand is sent to the root which finally arbitrates.
[0050] The root node (node B) which received the bus use demand determines whether a bus is made to use it for which node. This mediation work can perform only a root node and the licence of a bus is given to the node which won by mediation. By (b) of drawing 17 , a licence is given to node C and it is shown that the use demand of node F was refused. DP (data prefix) packet is sent to the node in which the Arbitration was lost, and it tells that the demand was refused. A bus use demand of the node by which the demand was refused is kept waiting to a next Arbitration.
[0051] The node which won the Arbitration as mentioned above and obtained the licence of a bus can start a data transfer henceforth. Here, a series of flowing of an Arbitration is explained with reference to flow chart drawing 26 . Drawing 26 is a flow chart showing the procedure of an Arbitration. In order for a node to be able to start data transfer, it is required for a bus to be an idle state. The data transfer currently performed previously is completed, and in order the present bus is vacant and to recognize that it is the status, it is judged that each node can start its transfer by passing the predetermined idle-time gap length (example . sub action gap) individually set up in each transfer mode.
[0052] In step S401, it judges whether the predetermined gap length according to the data transmitted, respectively, such as Async data and Iso data, was obtained. Unless a predetermined gap length is obtained, it waits for a demand of a bus royalty required in order to start a transfer until a predetermined gap length is obtained, since it cannot do. If the predetermined gap length in step S401 is obtained, it judges whether there are any data which should be transmitted in step S402, and if it is, it will progress to step S403.
[0053] At step S403, in order to carry out data transfer, a demand of a bus royalty is emitted to the root so that a bus may be secured. Finally the transmission of a signal showing the demand of a bus royalty at this time is sent to the root, relaying each device in a network, as shown in (a) of drawing 17 . On the other hand, when there are no data transmitted at step S402, it stands by as it is. Next, in step S404, a root node receives the bus use demand published at step S403. And in step S405, the root investigates the number of nodes which issued the use demand. When the number of nodes which advanced the use demand by step S405 is 1 (the node which issued the royalty demand is one), the next bus licence will be given to the node. On the other hand, in step S405, if it is node number >1 (the node which issued the use demand is a plurality), the root will perform the mediation work which determines the node which gives a licence in step S406 as one. This mediation work serves as the configuration that the right is equally granted so that it may be fair and only the nodes same each time may not obtain authorization (fair Arbitration).
[0054] Next, in step S407, selection divided into one node which the root arbitrated out of two or more nodes which advanced the use demand by step S406, and obtained the licence, and the node of the beaten others is performed. Here, the root sends an enabling signal to one node which is arbitrated and obtained the licence, or the node which obtained the licence without mediation by use demand node number =1 in step S405 to the node as step S408. The node which obtained the enabling signal carries out transfer start of the data (packet) which should be transmitted immediately after receiving. Moreover, in order that the node which DP (data prefix) packet which shows an Arbitration failure is sent to the node to which mediation of step S406 is lost and bus use was not permitted, and received this from the root in step S409 to it may issue the bus use demand for transmitting again, it returns to step S401, and it stands by until a predetermined gap length is obtained.
[0055] The above is flowing of the Arbitration by 1394 serial bus.
A <<****** clo eggplant (asynchronous [Asynchronous and]) transfer>> ****** clo eggplant transfer is asynchronous transmission. Drawing 18 is drawing showing the time transition state in a

****** clo eggplant transfer. The sub action gap of the beginning of drawing 18 shows the idle state of a bus. When this idle time becomes a constant value, it judges that the node which wishes to transmit can use a bus, a bus use demand is published, and the Arbitration for a bus acquisition is performed.

[0056] If the licence of a bus is obtained by the Arbitration, next, a data transfer will be performed in a packet format. A transfer completes the node which received the concerned data after data transfer by returning ack of a receiving result to the transmitted data (return code for the confirmation of receipt) after a short gap called ack gap, and answering, or sending a response packet. ack consists of a 4 bits information and a 4-bit checksum, and a transmitting agency node is immediately returned including the information whether it is in a success, a busy condition, and the pending status.

[0057] Next, the packet format of a ****** clo eggplant transfer is explained. Drawing 19 is drawing showing the example of the packet format of a ****** clo eggplant transfer. There are data division and a header unit other than data CRC for error correction in a packet. Purpose node ID, source node ID, a transfer data length, various codes, etc. which were shown in drawing 19 are written in a header unit, and a transfer is performed. Moreover, a ****** clo eggplant transfer is a communication of the one for one from a self-node to a partner node. Although the packet transmitted from the source node spreads round each node in a network, since things other than the address addressed to themselves are disregarded, only one node of the destination will read them. The above is an explanation of a ****** clo eggplant transfer.

[0058] A <<isochronous (Isochronous, synchronization) transfer>> isochronous transfer is synchronous transmission. Especially this isochronous transfer that can say that it is the greatest characteristic feature of 1394 serial bus is the transfer mode suitable for the data transfer which needs the real time transfer of picture data, multimedia data called voice data. Moreover, as for this isochronous transfer, data are uniformly transmitted to all other nodes from one node of the source by the broadcasting function to the ****** clo eggplant transfer (asynchronous) having been a transfer of a one for one.

[0059] Drawing 20 is drawing in an isochronous transfer showing a time transition state. An isochronous transfer is performed for every fixed-on bus time. This time interval is called isochronous cycle. The isochronous cycle time is 125 microseconds. The cycle-start packet is bearing the role which shows the start time of each of this cycle and performs timing of each node. The node called cycle master transmits a cycle-start packet, and after the data transfer end in the cycle in front of one, after passing through a predetermined idle term (sub action gap), it transmits the cycle-start packet which tells start of this cycle. The time interval to which this cycle-start packet is transmitted is set to 125 microseconds.

[0060] Moreover, as it was indicated in drawing 20 as channel A, channel B, and channel C, when two or more sorts of packets can give channel ID into 1 cycle, respectively, it can distinguish and transmit. By this, the real time transfer between two or more nodes is simultaneously possible, and he incorporates only the data of channel ID needed by the node which receives. This channel ID does not express the address of a sending place, and has given the logical number to data. Therefore, sending of a certain packet will be transmitted by broadcasting which spreads round all other nodes from the transmitting agency node of one.

[0061] Packet sending of an isochronous transfer is preceded and an Arbitration is performed like a ****** clo eggplant transfer. However, since it is not a communication of a one for one like a ****** clo eggplant transfer, ack (reply code for the confirmation of receipt) does not exist in an isochronous transfer. Moreover, it was shown in drawing 20 . Before performing an isochronous transfer, a bus is vacant as for iso gap (isochronous gap), and it expresses the idle term when it is required in order to recognize it as it being the status. If this predetermined idle term is passed, it can judge that the bus is vacant as for a node to perform an isochronous transfer, and the Arbitration before a transfer can be performed.

[0062] Below, the packet format of an isochronous transfer is explained. Drawing 21 is drawing showing the example of the packet format of an isochronous transfer. There is a header unit other than data division and data CRC for error correction in various kinds of packets divided into each channel, respectively. A transfer data length which was shown in drawing 21 , channel NO. in

addition various codes, HDR CRC for error correction, etc. are written in the header unit, and a transfer is performed. The above is an explanation of an isochronous transfer.

[0063] In the transfer on 1394 serial bus of <<bus cycle>> practice, an isochronous transfer and a ****** clo eggplant transfer can be intermingled. Drawing 22 is drawing showing the mode of time transition of the transfer status on a bus that the isochronous transfer and the ****** clo eggplant transfer were intermingled. Priority is given to an isochronous transfer over a ****** clo eggplant transfer, and it is performed. The ground is a gap length (isochronous gap) shorter than the gap length (sub action gap) of the idle term when it is required in order to start a ****** clo eggplant transfer after a cycle-start packet, and is because an isochronous transfer can be started. Therefore, an isochronous transfer will be given priority to and performed from a ****** clo eggplant transfer.

[0064] In the general bus cycle shown in drawing 22 , a cycle-start packet is transmitted to each node from a cycle master at the time of a start of cycle #m. By this, after performing time adjustment by each node and waiting for a predetermined idle term (isochronous gap), the node which should perform an isochronous transfer performs an Arbitration and goes into a packet transfer. In drawing 22 , the isochronous transfer of channel e, channel s, and the channel k is carried out at order.

[0065] If all isochronous transfers in cycle #m are completed after performing the operation from this Arbitration to a packet transfer by the channel to which it is given repeatedly, a ****** clo eggplant transfer can be performed. When the idle time reaches the sub action gap in which a ****** clo eggplant transfer is possible, it is judged that it can move from a node to perform a ****** clo eggplant transfer to execution of an Arbitration. However, in between from after an isochronous transfer end to the time (cycle synch) which should transmit the following cycle-start packet, the term which can perform a ****** clo eggplant transfer is restricted, when the sub action gap for starting a ****** clo eggplant transfer is obtained.

[0066] In cycle #m of drawing 22 , 2 packet (packet 1, packet 2) transfer of the ****** clo eggplant transfer (ack is included) is carried out after that with the isochronous transfer for three channels. Since after this ****** clo eggplant packet 2 continues till the time (cycle synch) which should start a cycle m+1, the transfer by cycle #m is finished even here.

[0067] However, supposing it continues till the time (cycle synch) which should transmit the following cycle-start packet during asynchronous or a synchronous transmission operation, after waiting for an idle term after are not interrupted by force but completing the transfer, the cycle-start packet of the following cycle is transmitted. That is, when one cycle continues 125 microseconds or more, the following cycle presupposes that much that it was shortened from 125 microseconds of criteria. Thus, on the basis of 125 microseconds, an isochronous cycle is exceeded and can be shortened. However, if it is the ** cycle need in order that an isochronous transfer may maintain a real-time transfer, it may surely perform, and a ****** clo eggplant transfer may be turned to the cycle after a degree by having shortened the cycle time. It is managed by the cycle master also including such retardation informations.

[0068] In the image processing system which outputs the picture image based on the image data which the image processing system and the output unit were connected with the enforcement gestalt 1 of the <enforcement gestalt 1> this invention, and was processed at the image processing system at an output unit, an image processing system which is shown in drawing 4 which constituted a digital camera as an image processing system, and constituted by the printer as an output unit is mentioned as an example, and is explained.

[0069] First, the functional configuration and its operation of a digital camera are explained using drawing 2 . Drawing 2 is the block diagram showing the functional configuration of the digital camera of the enforcement gestalt 1 of this invention. In addition, the case where the picture image corresponding to the image data shown in drawing 1 is recorded is mentioned as an example, and is explained here.

[0070] First, image formation of the picture image acquired from a lens system 21 is carried out on the 22nd page of CCD element. The analog signal obtained from the CCD element 22 is changed into a digital signal by the A/D-conversion section 23. It is transmitted to the image-processing section 24, and the changed digital signal is changed into the image data to which image

processings, such as color transform processing, edge highlight processing, and gamma amendment processing, were performed. Next, image data is transmitted to the image transformation section 25. In the image transformation section 25, for every pieces [several] pixel recordable [with one scanning of the record head of a printer], it is divided, and JPEG compression of the image data is carried out for every divided image data, and it is recorded by the data-logging section 26.

[0071] In addition, a management of the record to the data-logging section 26 of image data is performed based on the address of the data-logging section 26. For example, when image data A for the record medium of one sheet used for a record of a printer is divided into three image data A1, A2, and A3 and JPEG compression is carried out, each start address of the data-logging section 26 by which image data A1, A2, and A3 is recorded is managed by the address Management Department in the data-logging section 26 (un-illustrating).

[0072] The above processings are performed also to image data B and image data C. In this case, image data B is divided into image data B1, B-2, and B3, and JPEG compression is carried out, it is recorded to the data-logging section 26, image data C is divided into image data C1, C2, and C3, and JPEG compression is carried out, and it is recorded to the data-logging section 26. Next, the functional configuration and operation of the printer connected to the above-mentioned digital camera are explained using drawing 3 .

[0073] In addition, the printer of the enforcement gestalt 1 presupposes that it is the ink jet printer which carried the record head by the ink-jet formula, and a record head presupposes that 64 nozzles are arranged, respectively in the scanning direction (the orientation of a pixel), and orientation (the orientation of a line) perpendicular to the scanning direction of a record head, i.e., the conveyance orientation of a record medium. Moreover, each nozzle corresponds to 1 pixel of image data, and a record medium presupposes that the cut sheet of A4 size is used.

[0074] Drawing 3 is the block diagram showing the functional configuration of the printer of the enforcement gestalt 1 of this invention. An user chooses first the image data recorded by how many the image data recorded by the data-logging section 26 in a digital camera is recorded or which image data is recorded, and the printer by the interface section 31 on a printer. In addition, although not explained in full detail, as long as selection of the image data recorded by the printer has a display in a digital camera, it may display and choose the image data currently recorded by the data-logging section 26 on the display, and may choose it using the index print of the image data recorded by the data-logging section 26.

[0075] Here, the case where one image data A currently recorded by the data-logging section 26 is recorded to the record medium of A4 size is mentioned as an example, and is explained. If the image data (image data A) recorded by the printer is chosen, a printer will transmit the request signal for obtaining image data from the interface section 31 to a digital camera. A request signal is transmitted to the interface section 27 of a digital camera. And a digital camera transmits one of the image data which divided and carried out JPEG compression of the image data A to a printer that it should reply to the request signal.

[0076] In addition, as mentioned above, the split unit which divides image data A is determined by the pieces [several] pixel recordable by one scanning of the record head of a printer. For example, since the number of the nozzles of the orientation of a pixel of a record head (the number of pixels) is 64 when image data A is 832 pixel (line) x640 pixel (pixel), image data A is divided per 832 pixel (line) x 64 pixels (pixel). That is, JPEG compression of each is carried out and image data A is recorded by the data-logging section 26, after dividing into A9 and 10 of A10, image data A1, A2 and A3, --,.

[0077] Moreover, before transmitting to a printer the image data which an user sets up from the interface section 27 of a digital camera beforehand, or is recorded by the data-logging section 26 of a digital camera, you may make the number recordable by one scanning of a record head of pixels a configuration which a printer notifies to a digital camera. moreover -- or you may set up as a default value beforehand like the enforcement gestalt 3 mentioned later

[0078] Next, the image data (for example, image data A1) which the printer received from the digital camera and by which JPEG compression was carried out is transmitted to JPEG defrosting processing section 32. And JPEG defrosting of the image data A1 by which JPEG compression

was carried out in JPEG defrosting processing section 32 is carried out. As for the image data A1 by which JPEG defrosting was carried out, color transform processing and binary-ized processing are made by the print image-processing section 33. The image data A1 made binary is transmitted to the record positional-controller processing section 34, and the position which should keep on a record medium on record is managed.

[0079] In addition, the positional controller in the record positional-controller processing section 34 is performed by controlling the write-in position of the buffer memory 36 corresponding to the image data made binary. Next, it is transmitted to the head driving-signal transducer 35, and the image data by which the positional controller was carried out and which was made binary is changed into the record signal for operating a record head. Next, a record signal is once stored in buffer memory 36. And based on the positional controller by the record positional-controller processing section 34, a record signal is transmitted to the printer engine 37 one by one, and the picture image based on the record signal is recorded on a record medium.

[0080] The above is a record procedure by one scanning of the record head of the printer of the enforcement gestalt 1. If the record by one scanning of a record head is completed, in order to obtain image data required for a record of 1 scanning of the following record head from a digital camera, a request signal will be again transmitted to a digital camera by the interface section 31 of a printer. In a digital camera, if a request signal is received from a printer, the image data (here image data A2) required for one scanning of the next record head of a printer by which JPEG compression was carried out will be transmitted to a printer. And the picture image corresponding to the image data A2 which received from the digital camera and by which JPEG compression was carried out is recorded on a record medium by the same record procedure mentioned above.

[0081] If the above record procedures are performed one by one to the divided image data which was compressed and the picture image corresponding to image data A10 is recorded on a record medium, the record of a picture image corresponding to image data A will be completed. Next, the record procedure in the case of recording two or more picture images is explained to the scanning direction of a record head. In addition, in order to simplify an explanation, the image data which a printer chooses and to record shall be set as the scanning direction of a record head so that picture image B corresponding to picture image A and image data B corresponding to image data A may be recorded as image data B of image data A mentioned above, image data A, and the same size is chosen and it is shown in drawing 6 .

[0082] First, image data B corresponding to image data A and picture image B corresponding to picture image A inputted from the digital camera is the same record procedure mentioned above, and JPEG compression of it is divided and carried out for every pieces [several] pixel recordable by one scanning of a record head, and it is recorded by the data-logging section 26. Then, the request signal of image data more nearly required for a record than a printer is transmitted to a digital camera. The digital camera which received the request signal from the printer transmits to a printer the image data A1 by which JPEG compression was carried out, then the image data B1 by which JPEG compression was carried out as image data required for one scanning of the record head of the beginning of a printer.

[0083] And a printer receives the image data A1 by which JPEG compression was carried out from a digital camera, and once stores it in the position of buffer memory 36 through an above-mentioned record procedure. Then, the image data B1 by which JPEG compression was carried out is received from a carrier digital camera, and it once stores in the position different from the position where the image data A1 of buffer memory 36 is stored by the same record procedure. If image data A1 and the image data B1 are stored in buffer memory 36, based on the positional controller of the record positional-controller processing section 34, the picture image which is transmitted to the printer engine 37 one by one, and corresponds will be recorded on a record medium.

[0084] If it carries out one by one to image data A10 and the image data B10 and image data A2, image data B-2, the image data A3, the image data B3, --, the picture image corresponding to image data A10 and the image data B10 are recorded on a record medium, a record of picture image B corresponding to picture image A and image data B corresponding to image data A will complete the above record procedures.

[0085] In addition, although the enforcement gestalt 1 explained the configuration which outputs the picture image which connects to a printer the image data currently recorded by the data-logging section 26 of a digital camera, and corresponds, it cannot be overemphasized that the picture image which connects with a personal computer and corresponds to drawing 5 so that it may be shown can be outputted to the monitor of a personal computer. Moreover, although the case where two picture image A and picture image B were put in order and recorded to the scanning direction of a record head as an example which records two or more picture images was explained, it is also possible to put in order and record two or more picture images to the scanning direction of a record head. Furthermore, it is also possible to put in order and record two or more picture images in the scanning direction of a record head which is shown in drawing 7 , and the conveyance orientation of a record medium.

[0086] Furthermore, although it shines, using JPEG compression formula as a compression formula of image data corresponding to the picture image inputted into the digital camera, it is not limited to this. According to the enforcement gestalt 1, as explained above, the image data inputted from the digital camera is divided for every number of pixels recordable by one scanning of the record head of a printer, and since the divided image data is received and recorded for every scanning of a record head, ** which performs efficiently the send action of the image data to a printer and a record operation of a printer from a digital camera is made. Consequently, the total throughput of an image processing system can be improved.

[0087] Moreover, since it keeps on record by receiving image data required for one scanning of the record head of a printer one by one, the buffer memory 36 with the storage capacity for memorizing the image data of the whole picture image recorded to a record medium is not needed. Consequently, the storage capacity of buffer memory 36 can be reduced.

With the <enforcement gestalt 2> enforcement gestalt 2, a digital camera and a printer are connected and the image processing system which expands or reduces the size of the picture image corresponding to the image data inputted with the digital camera, and is recorded by the printer is explained as enforcement gestalt 2.

[0088] In addition, about the functional configuration and operation of the digital camera of the enforcement gestalt 2, since it is the same as that of drawing 1 of the enforcement gestalt 1, the detail is omitted here. Next, the functional configuration and operation of the printer of the enforcement gestalt 2 are explained using drawing 8 . Drawing 8 is the block diagram showing the functional configuration of the printer of the enforcement gestalt 2 of this invention.

[0089] In addition, the record head of the printer of the enforcement gestalt 2 presupposes that the same thing as the record head of the printer of the enforcement gestalt 1 is used. First, by the interface section 31 on a printer, an user sets up the scale factor of the size of the picture image to record, an expansion, or reduction while he chooses the image data recorded by how many the image data recorded by the data-logging section 26 in a digital camera is recorded or which image data is recorded, and the printer. In addition, although not explained in full detail, as long as selection of the image data recorded by the printer and a setup of a size have a display in a digital camera, they may display and choose the image data recorded by the data-logging section 26 on the display, and may choose it using the index print of the image data recorded by the data-logging section 26.

[0090] Here, the case where expand image data A of the enforcement gestalt 1 mentioned above twice, and one sheet is recorded to the record medium of A4 size is mentioned as an example, and is explained. If selection and its size to record are set up for the image data (image data A) recorded by the printer, a printer will transmit the request signal for obtaining image data from the interface section 81 to a digital camera. A request signal is transmitted to the interface section 27 of a digital camera. And a digital camera transmits to a printer the image data A1 which divided and carried out JPEG compression of the image data A that it should reply to the request signal.

[0091] The image data A1 which the printer received from the digital camera and by which JPEG compression was carried out is transmitted to JPEG defrosting processing section 82. And JPEG defrosting of the image data A1 by which JPEG compression was carried out in JPEG defrosting processing section 82 is carried out. The image data A1 by which JPEG defrosting was carried out is stored in buffer memory 1 (83). The image data stored in buffer memory 1 (83) is the print

image-processing section 84, and conversion of a picture image size is performed. since it is set up here so that image data may be expanded twice -- the inside of buffer memory 1 (83) to the image data A1 (832 pixel x64 pixel), and 832pixelx -- the image data for 32 pixels is read and it expands to 1664 pixel x64 pixel image data by well-known scale-factor transform processing

[0092] And color transform processing and binary-ized processing are made to the expanded image data. The image data made binary is transmitted to the record positional-controller processing section 85, and the position which should keep on a record medium on record is managed. In addition, the positional controller in the record positional-controller processing section 85 is performed by controlling the write-in position of the buffer memory 2 corresponding to the image data made binary (87). And it is transmitted to the head driving-signal transducer 86, and the image data by which the positional controller was carried out and which was made binary is changed into the record signal for operating a record head. Next, a record signal is once stored in buffer memory 2 (87). And based on the positional controller by the record positional-controller processing section 85, a record signal is transmitted to the printer engine 88 one by one, and the picture image based on the record signal is recorded.

[0093] next, remaining 832pixelx of the image data A1 stored in buffer memory 1 (83) -- the image data for 32 pixels is recorded with the same procedure in the position which should keep on a record medium on record If all the image data stored in buffer memory 1 (83) is recorded, a printer will transmit the request signal of the following image data A2 to a digital camera. And if the following image data A2 is received from a digital camera, the picture image corresponding to image data A2 will be recorded with the same procedure performed to image data A1 in the position which should keep on a record medium on record. If the above record procedures are performed one by one to the divided image data which was compressed and the picture image corresponding to image data A10 is recorded on a record medium, the record of a picture image corresponding to image data A will be completed. Next, the case where reduce image data A to 1/2, and one sheet is recorded to the record medium of A4 size is explained.

[0094] If selection and its size to record are set up for the image data (image data A) recorded by the printer, a printer will transmit the request signal for obtaining image data from the interface section 81 to a digital camera. A request signal is transmitted to the interface section 27 of a digital camera. And a digital camera transmits to a printer the image data A1 which divided and carried out JPEG compression of the image data A that it should reply to the request signal. The image data A1 which the printer received from the digital camera and by which JPEG compression was carried out is transmitted to JPEG defrosting processing section 82. And JPEG defrosting of the image data A1 by which JPEG compression was carried out in JPEG defrosting processing section 82 is carried out. The image data A1 by which JPEG defrosting was carried out is stored in buffer memory 83. The image data stored in buffer memory 1 (83) is the print image-processing section 84, and conversion of a picture image size is performed. Here, since it is set up so that image data may be reduced to 1/2, image data A1 (832 pixel x64 pixel) is read from buffer memory 1 (83), and it reduces to 416 pixel x32 pixel image data by well-known scale-factor transform processing. And color transform processing and binary-ized processing are made to the reduced image data. The image data made binary is transmitted to the record positional-controller processing section 85, and the position which should keep on a record medium on record is managed. It is transmitted to the head driving-signal transducer 86, and the image data by which the positional controller was carried out and which was made binary is changed into the record signal for operating a record head. Next, a record signal is once stored in buffer memory 2 (87).

[0095] Next, with the same procedure, image data A2 is received from a digital camera, and the record signal corresponding to image data A2 is stored after the position where the record signal corresponding to the image data A1 of buffer memory 2 (87) is stored. image data A1 and A2 -- if it is alike, respectively and the record signal of two corresponding is stored in buffer memory 2 (87), each record signal will be transmitted to the printer engine 88 one by one based on the positional controller by the record positional-controller processing section 85, and the picture image based on the record signal will be recorded on a record medium

[0096] It is a record procedure by one scanning of a record head in case the above contracts to 1/2 and records image data. After the record by one scanning of a record head is completed, in order to

obtain image data required for a record of 1 scanning of the following record head from a digital camera, a request signal is again transmitted to a digital camera by the interface section 81 of a printer. In a digital camera, if a request signal is received from a printer, the image data (here image data A3 and A4) required for a scanning of the next record head of a printer by which JPEG compression was carried out will be transmitted to a printer. And the picture image corresponding to the image data A3 and A4 which received from the digital camera and by which JPEG compression was carried out is recorded by the same record procedure mentioned above in the position which should keep on a record medium on record. If the above record procedures are performed one by one to the divided image data which was compressed and the picture image corresponding to image data A10 is recorded on a record medium, the record of a picture image corresponding to image data A will be completed. In addition, although the case where expand twice and it keeps on record as a size of the image data to record, and the case where reduced to 1/2 and it kept on record were mentioned as the example and the enforcement gestalt 2 explained them, it expands by 3 times and 4 times, and when it reduces by a record, 1/3 time, and 1/4 time and it keeps on record, it can correspond in the same procedure. Moreover, although the case where one picture image was recorded to a record medium was explained here, as the enforcement gestalt 1 explained, it is also possible to record two or more picture images on a record medium. As explained above, when according to the enforcement gestalt 2 it changes the size of the image data inputted with the digital camera and it records the picture image corresponding to the changed image data by the printer, the same effect as the enforcement gestalt 1 can be acquired.

[0097] With the <enforcement gestalt 3> enforcement gestalt 1 and the enforcement gestalt 2, although it was the configuration of inputting the pieces [several] pixel which is the unit which divides the image data inputted from the digital camera from an user or a printer, you may use the default value beforehand determined in this. The digital camera and printer by which the pieces [several] pixel which is the unit to divide is hereafter determined by the default are connected, and the image processing system which records the picture image corresponding to the image data inputted with the digital camera by the printer is explained as enforcement gestalt 3.

[0098] In addition, about the functional configuration and operation of the digital camera of the enforcement gestalt 3, and a printer, since it is the same as that of the enforcement gestalt 2, the detail is omitted here. Moreover, generally the number of nozzles of the record head of a printer turns into the multiple of eight on the problem of a data control. namely, . The pieces [several] pixel whose record is attained by one scanning of a record head serves as the multiple of 8. Therefore, the pieces [several] pixel which is the unit which divides the image data beforehand determined within the digital camera is set as the multiple of 8. Moreover, it is desirable to set a pieces [several] pixel as the multiple of 8 also from the compression unit of JPEG compression to image data being 8 pixel x8 pixel.

[0099] Here, within a digital camera, the pieces [several] pixel which is the unit which divides the image data determined beforehand is 32, and the case where one image data A of the enforcement gestalt 1 mentioned above is recorded to the record medium of A4 size is mentioned as an example, and is explained. first -- since the size of image data A currently recorded by the data-logging section 26 in the digital camera is 832 pixel x640 pixel -- image data A -- 832pixelx -- the image data A1 and A2 in every 32 pixels, and -- it is divided into 20 of A20, JPEG compression is carried out, and the data-logging section 26 keeps on record And if the request signal for obtaining image data from the interface section 31 of a printer is transmitted to a digital camera, a digital camera will transmit to a printer the pieces [several] (here 32) pixel which is the split unit of image data. A printer measures the pieces [several] pixel and a pieces [several] pixel recordable by one scanning of a record head, and determines the number of the image data which can receive from a digital camera at a time and by which JPEG compression was divided and carried out based on the comparison result. (With the enforcement gestalt 3, since a pieces [several] pixel recordable by one scanning of a record head is 64, the image data whose number is two and which was divided and compressed is needed.)

Then, a printer receives the image data A1 by which JPEG compression was carried out from a digital camera, and the image data A1 which received and by which JPEG compression was carried out is transmitted to JPEG defrosting processing section 82. And JPEG defrosting of the

image data A1 by which JPEG compression was carried out in JPEG defrosting processing section 32 is carried out. The image data A1 by which JPEG defrosting was carried out is stored in buffer memory 1 (83). Then, the image data A2 by which JPEG compression was carried out is received from a digital camera, and it stores in buffer memory 1 (83) in the same procedure. Color transform processing and binary-ized processing are made to the image data stored in the buffer memory 1 (83). The image data made binary is transmitted to the record positional-controller processing section 85, and the position which should keep on a record medium on record is managed.

[0100] Next, it is transmitted to the head driving-signal transducer 86, and the image data by which the positional controller was carried out and which was made binary is changed into the record signal for operating a record head. Next, a record signal is once stored in buffer memory 2 (87). And based on the positional controller by the record positional-controller processing section 85, a record signal is transmitted to the printer engine 88 one by one, and the picture image based on the record signal is recorded on a record medium.

[0101] It is a record procedure by one scanning of a record head in case the pieces [several] pixel whose above is the unit which divides the image data in a digital camera is determined beforehand. After the record by one scanning of a record head is completed, in order to obtain image data required for a record of 1 scanning of the following record head from a digital camera, a request signal is again transmitted to a digital camera by the interface section 81 of a printer. In a digital camera, if a request signal is received from a printer, the image data (here image data A3 and A4) required for a scanning of the next record head of a printer by which JPEG compression was carried out will be transmitted to a printer. And the picture image corresponding to the image data A3 and A4 which received from the digital camera and by which JPEG compression was carried out is recorded by the same record procedure mentioned above in the position which should keep on a record medium on record.

[0102] If the above record procedures are performed one by one to the divided image data which was compressed and the picture image corresponding to image data A20 is recorded on a record medium, the record of a picture image corresponding to image data A will be completed. In addition, the pieces [several] pixel which is the unit which divides the image data in a digital camera with the enforcement gestalt 3 is although it determined beforehand 32. If it is the multiple of 8, it will not be restricted to this.

[0103] As explained above, even when the pieces [several] pixel which is the unit which divides the image data in a digital camera is determined beforehand according to the enforcement gestalt 3, image data required for one scanning of a record head can be received by measuring the pieces [several] pixel and a pieces [several] pixel recordable by one scanning of the record head of a printer. Therefore, also in such a case, the same effect as the enforcement gestalt 1 can be acquired.

[0104] In addition, the decision technique of the pieces [several] pixel which is the split unit which divides image data within the digital camera of the image processing system of this invention is divided roughly into two, the technique of acquiring from a pieces [several] pixel recordable by the input from an user, or one scanning of the record head of a printer, and the technique of determining beforehand within the digital camera. If its attention is directed to this viewpoint, the enforcement gestalt 1 and 2 corresponds to the technique of gaining the pieces [several] pixel which is a split unit from the input or printer from an user, and the technique the enforcement gestalt 3 determines the pieces [several] pixel beforehand within the digital camera.

[0105] Then, processing performed by the image processing system in the enforcement gestalt 1 and 2 and processing performed by the image processing system in the enforcement gestalt 3 are explained as a schema of processing performed by the image processing system of this invention using the flow chart of drawing 9 and drawing 10 . First, the schema of processing performed by the image processing system in the enforcement gestalt 1 and 2 is explained using drawing 9 .

[0106] Drawing 9 is a flow chart which shows the schema of processing of the image processing system of the enforcement gestalt 1 and 2 of this invention. First, the number recordable by one scanning of a record head of pixels is gained from the input or printer from an user at step S101 to a digital camera side. Next, according to the gained number of pixels, image data is divided at step

.S202. Next, JPEG compression of the divided image data is carried out, and it keeps on record among the data-logging section 26.
[0107] boil selection of the image data made to output to a printer side at step S104, and a setup of a picture image size interface section 31 (or interface section 81) -- it ******s The image data by which JPEG compression was carried out from the digital camera at step S105 according to the input from the interface section 31 (or interface section 81) is inputted. At step S106, JPEG defrosting of the inputted image data by which JPEG compression was carried out is carried out. After performing a required image processing at step S107 to the image data by which JPEG defrosting was carried out, it keeps on record with the printer engine 37 (or printer engine 88).
[0108] Next, the schema of processing performed by the image processing system in the enforcement gestalt 3 is explained using drawing 10 . Drawing 10 is a flow chart which shows the schema of processing of the image processing system of the enforcement gestalt 3 of this invention. First, image data is divided according to the predetermined number of pixels which is the split unit of the image data beforehand determined as the digital camera side at step S201. Next, at step S202, JPEG compression of the divided image data is carried out, and it keeps on record among the data-logging section 26.
[0109] The information which shows from a printer the predetermined number of pixels which is the split unit of image data at step S203 is inputted into a printer side. Step S204 compares the number recordable by one scanning of the record head of the predetermined number of pixels and printer which were inputted of pixels. The image data by which JPEG compression was carried out from the digital camera at step S205 based on the comparison result is inputted. At step S206, JPEG defrosting of the inputted image data by which JPEG compression was carried out is carried out. After performing a required image processing at step S207 to the image data by which JPEG defrosting was carried out, it keeps on record with the printer engine 88.
[0110] Since the image data by which JPEG compression of the picture image by which the partial split was carried out within the digital camera was carried out is transmitted to a printer by needed image data according to the enforcement gestalt 1 - the enforcement gestalt 3 as explained above, the time of a transfer can be shortened. Moreover, since image data is received and recorded for every number of pixels recordable by one scanning of the record head of a printer, it is enabled to reduce the storage capacity of buffer memory greatly compared with the former. What is necessary is to face acquiring the output unit information which shows the output unit of the image data of an output unit, and just to obtain by communicating the ****** clo eggplant packet shown in drawing 22 in the enforcement gestalt of this invention. Moreover, it may face compressing the inputted image data based on such an output unit information, and you may receive by the isochronous packet which shows such image data to drawing 22 , and may receive by the ****** clo eggplant packet. Receiving by the isochronous packet is desirable in respect of a receiving speed. Moreover, receiving by the ****** clo eggplant packet is desirable in respect of the certainty of received data. Moreover, although the IEEE1394 serial bus was mentioned as the example and this enforcement gestalt explained it, this invention may not be limited to this, other interfaces, for example, the interface called USB, are sufficient as it, and the interface of the other formula is sufficient as it.
[0111] In addition, even if it applies this invention to the system which consists of two or more devices (for example, a host computer, an interface device, a reader, a printer, etc.), you may apply it to the equipments (for example, a copying machine, facsimile apparatus, etc.) which consist of one device. Moreover, the purpose of this invention cannot be overemphasized by being attained by reading and performing the program code which supplies the storage which recorded the program code of software which realizes the function of the enforcement gestalt mentioned above to a system or equipment and by which the system or the computer (or CPU and MPU) of equipment was stored in the storage.
[0112] In this case, the function of the gestalt of enforcement which the program code read from the storage itself mentioned above will be realized, and the storage which memorized the program code will constitute this invention. As a storage for supplying a program code, a floppy disk, a hard disk, an optical disk, a magneto-optic disk, CD-ROM, CD-R, a magnetic tape, a nonvolatile memory card, ROM, etc. can be used, for example.

[0113] Moreover, being contained when the function of the gestalt of enforcement which performed a part or all of processing that OS (operating system) which is working on a computer is actual, based on designation of the program code, and the function of the enforcement gestalt mentioned above by performing the program code which the computer read is not only realized, but was mentioned above by the processing is realized cannot be overemphasized. Furthermore, being contained, when the function of the enforcement gestalt which performed a part or all of processing that CPU with which the expansion board and an expansion unit are equipped is actual, and was mentioned above by the processing is realized based on designation of the program code, after writing the program code read from the storage in the memory with which the expansion unit connected to the expansion board inserted in the computer or the computer is equipped cannot be overemphasized.

[0114]

[Effect of the invention] The image processing system which can improve a total throughput and its control technique, an image processing system, an output unit, and a storage can be offered, without raising a cost according to this invention, as explained above.

[Translation done.]

* NOTICES *

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damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim]
[Claim 1] The image processing system carry out having the means of communications which is the image processing system which processes to the inputted image data and outputs to an output unit, and communicates to the aforementioned output unit and mutual, a receiving means receive the output unit information which shows the output unit of the image data of the aforementioned output unit from this output unit through the aforementioned means of communications, and a compression means divide and compress the image data by which an input was carried out [aforementioned] based on the output unit information which received with the aforementioned receiving means as the characteristic feature.
[Claim 2] The aforementioned compression means is an image processing system given in the claim 1 characterized by having a storage means to memorize the compressed image data.
[Claim 3] An image processing system given in the claim 1 characterized by transmitting the image data memorized by the aforementioned storage means according to the output setup of the aforementioned output unit and the aforementioned output unit to this output unit through the aforementioned means of communications.
[Claim 4] The aforementioned output setup is an image processing system given in the claim 3 characterized by including a setup about an expansion/reduction percentage of the picture image outputted at least, and a picture image size.
[Claim 5] The aforementioned compression means is an image processing system given in the claim 1 characterized by dividing the image data by which the input was carried out [aforementioned] per predetermined, and compressing it.
[Claim 6] The aforementioned predetermined unit is an image processing system given in the claim 5 characterized by being the number of pixels of the multiple of 8.
[Claim 7] The aforementioned compression means is an image processing system given in the claim 6 characterized by dividing and compressing the this inputted image data for every number of pixels of the multiple of the above 8 to either [at least] the orientation of a pixel of the image data by which the input was carried out [aforementioned], or the orientation of a line.
[Claim 8] The aforementioned means of communications is an image processing system given in the claim 1 characterized by being an IEEE1394 serial bus.
[Claim 9] The control technique of the image processing system characterized by to have the receiving process which receives the output unit information which it is the control technique of the image processing system which processes to the inputted image data and is outputted to an output unit, and shows the output unit of the image data of the aforementioned output unit from this output unit, and the pressing operation which divide and compress the image data by which the input was carried out [aforementioned] based on the output unit information that it received at the aforementioned receiving process.
[Claim 10] The aforementioned pressing operation is the control technique of an image processing system given in the claim 9 characterized by having the storage process which memorizes the compressed image data to a storage.
[Claim 11] The control technique of an image processing system given in the claim 9 characterized by transmitting the image data memorized by the aforementioned storage according to the output setup of the aforementioned output unit and the aforementioned output unit to this output unit.

[Claim 12] The aforementioned output setup is the control technique of an image processing system given in the claim 11 characterized by including a setup about an expansion/reduction percentage of the picture image outputted at least, and a picture image size.
[Claim 13] The aforementioned pressing operation is the control technique of an image processing system given in the claim 9 characterized by dividing the image data by which the input was carried out [aforementioned] per predetermined, and compressing it.
[Claim 14] The aforementioned predetermined unit is the control technique of an image processing system given in the claim 13 characterized by being the number of pixels of the multiple of 8.
[Claim 15] The aforementioned pressing operation is the control technique of an image processing system given in the claim 14 characterized by dividing and compressing the this inputted image data for every number of pixels of the multiple of the above 8 to either [at least] the orientation of a pixel of the image data by which the input was carried out [aforementioned], or the orientation of a line.
[Claim 16] It is the image processing system which has the image processing system which processes to the inputted image data, and the output unit which outputs the picture image based on the image data processed by this image processing system. The means of communications which communicates mutually by the aforementioned image processing system and the aforementioned output unit, and the aforementioned means of communications are minded. A 1st transfer means to transmit the output unit information which shows the output unit of the image data of the aforementioned output unit to the aforementioned image processing system, A compression means to divide and compress the image data by which the input was carried out [aforementioned] based on the output unit information notified with the aforementioned notice means, The image processing system by which it is having [a 2nd transfer means to transmit the image data compressed with the aforementioned compression means according to the output setup of the aforementioned output unit and the aforementioned output unit to this output unit]-through aforementioned means of communications characterized.
[Claim 17] The aforementioned output setup is an image processing system given in the claim 16 characterized by including a setup about an expansion/reduction percentage of the picture image outputted at least, and a picture image size.
[Claim 18] The aforementioned compression means is an image processing system given in the claim 16 characterized by having a storage means to memorize the compressed image data.
[Claim 19] The aforementioned compression means is an image processing system given in the claim 16 characterized by dividing the image data by which the input was carried out [aforementioned] per predetermined, and compressing it.
[Claim 20] The aforementioned means of communications is an image processing system given in the claim 16 characterized by being an IEEE1394 serial bus.
[Claim 21] The output unit characterized by to have the means of communications which is the output unit which outputs the picture image based on the image data inputted from the image processing system, and communicates to the aforementioned image processing system and mutual, a transmitting means transmit the output unit information which shows the output unit of the image data of the concerned output unit to the aforementioned image processing system through the aforementioned means of communications, and a receiving means receive the aforementioned output unit and the image data according to an output setup of the concerned output unit from the aforementioned image processing system through the aforementioned means of communications.
[Claim 22] The aforementioned output setup is an output unit given in the claim 21 characterized by including a setup about an expansion/reduction percentage of the picture image outputted at least, and a picture image size.
[Claim 23] The image data inputted from the aforementioned image processing system is an output unit given in the claim 21 characterized by having further a defrosting means to thaw the image data by which is compressed image data and compression was carried out [aforementioned].
[Claim 24] It is the output unit of the publication by the claim 21 carry out determining the number of image data which the image data inputted from the aforementioned image processing system is the image data compressed per predetermined, the aforementioned receiving means receives the information which shows the aforementioned predetermined unit from the aforementioned image

processing system, is equipped with a comparison means compare the information and the aforementioned output unit information which show this predetermined unit, and was compressed per [aforementioned / corresponding to the aforementioned output unit] predetermined based on the comparison result of the aforementioned comparison means as the characteristic feature.
[Claim 25] The aforementioned means of communications is an output unit given in the claim 21 characterized by being an IEEE1394 serial bus.
[Claim 26] The storage carry out having the program code of the program code of a receiving process which receives the output unit information that the program code of a control of the image processing system which processes to the inputted image data and outputs to an output unit is stored, and technique is the storage [computer] which can be read and shows the output unit of the image data of the aforementioned output unit, from this output unit, and the pressing operation which divide and compress the image data by which an input was carried out based on the output unit information received at the aforementioned receiving process as the characteristic feature.

[Translation done.]